PATENT ABSTRACTS OF JAPAN

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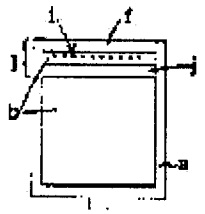
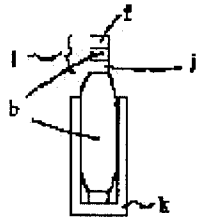
(54) INK DEAERATING METHOD

(57)Abstract:
PURPOSE: To obtain an ink deaerating method for effectively removing bubbles and dissolved gas in an ink without changing and decomposing the ink composition and without damaging stability by filling an ink bag having gas barrier property with the ink and sealing it, and sealing a lower part of the bag from an upper part of the bag so as to sandwich bubbles while the bag is being erected.
CONSTITUTION: Immediately after an ink bag is filled with an ink, sealed, and heated, secondary sealing is performed by sealing a lower part (j) of the ink bag from an upper seal of the ink bag so as to sandwich bubbles (i) together with the ink (b) while the ink bag (a) is being erected so as to discharge the bubbles in the bag. In order to eliminate irregularities in the discharge quantity and the quantity of the ink in the ink bag, a bag thickness adjusting jig (k) is used at the time of the secondary sealing. After the secondary sealing, a side 1 at an upper end of the bag confining bubbles may remain attached to the bag body, or it may be cut off. As a means for confirming quantities of dissolved gas and the bubbles in the ink bag, when the dissolved gas is air, quantity of dissolved oxygen is measured by using a dissolved oxygen meter on the market so as to estimate entire quantity of air.





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CLAIMS

[Claim(s)]
[Claim 1] The ink deaeration approach characterized by carrying out the seal of the lower part so that air bubbles may be put from the upper part of an ink bag while standing an ink bag after filling up with and sealing ink into the ink bag which has gas barrier nature.
[Claim 2] The ink deaeration approach according to claim 1 characterized by using the fixture for bag thickness adjustment when carrying out the seal of the lower part from the upper part of an ink bag, standing an ink bag so that air bubbles may be put.
[Claim 3] The ink deaeration approach according to claim 1 or 2 characterized by carrying out the seal of the lower part so that air bubbles may be put from the upper part of an ink bag while heating an ink bag at 50 degrees C or more and standing an ink bag, after filling up with and sealing ink into the ink bag which has gas barrier nature.
[Claim 4] The ink deaeration approach of the publication according to claim 1, 2, or 3 characterized by decompressing the ink restoration and/or seal to an ink bag below to atmospheric pressure, and performing them in ordinary temperature.
[Claim 5] The ink deaeration approach according to claim 4 characterized by performing the ink restoration and/or seal to an ink bag by 50 or less mmHgs.
[Claim 6] The ink deaeration approach according to claim 1, 2, or 3 characterized by performing the ink restoration and/or seal to an ink bag while the temperature of ink heats at 50 degrees C or more by ordinary pressure.
[Claim 7] The ink deaeration approach according to claim 3 that heating temperature of the ink bag after ink bag seal is characterized by 50-degree-C or more being less than 70 degrees C.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the ink deaeration approach of the ink for ink jet record in more detail about the ink deaeration approach.
[0002]
[Description of the Prior Art] An ink jet recording method tends to be influenced [the air bubbles in ink, or] of a dissolved gas, and the ink jet recording method especially using a piezo method has the problem of often producing the abnormalities in injection, with the air bubbles shut up by dissolved gases and containers, such as air dissolved in ink. Therefore, the proposal not to shut up air bubbles into clearance and the container of the dissolved gas in ink is made.
[0003] For example, the method of reducing dissolved quantity of gas is proposed by JP,52-74406,A and JP,53-61412,A by dissolving a deoxidant in water color ink by removing oxygen among the air dissolved in ink. The manufacture approach of the ink cartridge for ink jet printers which vacuum-packs further the ink by which high deaeration was carried out under a high vacuum at the time of restoration is proposed by JP,62-121062,A. When the ink manufactured using the manufacturing installation possessing a heating means and a reflux means is set by the 70-degree C environment after deaeration for 160 hours, the manufacture approach of the ink for

ink jet record of having the process which controls a heating means so that the yield of nitrogen in the meantime is set to 2-10 ppm is proposed by JP,2-91165,A.
[0004]
[Problem(s) to be Solved by the Invention] By the approach given in above-mentioned JP,52-74406,A and JP,53-61412,A, it is only oxygen which is removable with a deoxidant, and a dissolved gas could not be removed thoroughly, but it had the trouble that the reactant after the deoxidant or the deoxidant oxidized by oxygen further had an adverse effect on the stability of ink. By the approach of a publication, it had the trouble of being easy to produce ink presentation change by evaporation of the ink component of a low-boiling point, by high deaeration in JP,62-121062,A. By the approach of a publication, it had the trouble of being easy to produce not only evaporation of a low-boiling point component but deterioration of ink, in JP,2-91165,A with heating at high temperature 80 degrees C or more and heating over 70-degree-C 160 hours of after that.
[0005] The technical problem which this invention tends to solve is to offer the ink deaeration approach of removing the air bubbles and dissolved gas in ink effectively, without there being no change and ink deterioration of an ink presentation, and spoiling the stability of ink.
[0006]
[Means for Solving the Problem] this invention person etc. came to solve this invention, as a result of repeating research wholeheartedly, in order to solve the above-mentioned technical problem.
[0007] That is, this invention offers the ink deaeration approach which carries out the seal of the lower part from the upper part of an ink bag so that air bubbles may be put, standing an ink bag, after filling up with and sealing ink into the ink bag which has gas barrier nature, in order to solve the above-mentioned technical problem.
[0008] In the above-mentioned ink deaeration approach which carries out the seal of the lower part from the upper part of an ink bag further in the approach of this invention so that air bubbles may be put while standing (1) ink bag Heating an ink bag at 50 degrees C or more, and standing an ink bag, after filling up with and sealing ink into using the fixture for bag thickness adjustment, and (2) ink bag, from the upper part of an ink bag, the seal of the lower part is carried out so that air bubbles may be put, (3) In ordinary temperature, the ink restoration and/or seal to an ink bag are decompressed below to atmospheric pressure, and are performed, (4) At a room temperature, below atmospheric pressure, it decompresses to 50 or less mmHgs preferably, and the ink restoration and/or seal to an ink bag are performed, (5) When the temperature of ink heats preferably the ink restoration and/or seal to an ink bag at 50 degrees C or more less than 70 degrees C and performs them 50 degrees C or more by ordinary pressure, ink can be deaerated more effectively.
[0009] Hereafter, the configuration of this invention is explained to a detail along with a drawing.
[0010] The ink bag a which has the gas barrier nature of this invention of drawing 1 has the desirable laminate film which consists of laminate films more than two-layer [of the plastic material which can heat weld an inner surface like polyethylene (PE) and polypropylene (PP), and the plastic material which was excellent in the gas barrier property like polyethylene terephthalate (PET), nylon, a polyvinyl chloride, a polyvinylidene chloride, and polyvinyl alcohol in the outside surface], and has the layer of metallic foils, such as aluminum, or the metal vacuum evaporationo film between an inner surface and an outside surface preferably.
[0011] the oily ink in which the ink b with which an ink bag is filled up uses the organic solvent

of water color ink, a low-boiling point, or a high-boiling point as the main solvent -- either is usable.

[0012] Although the restoration c of the ink to an ink bag does not need to perform deaeration actuation of ink in advance, deaeration d of ink may be performed to extent which does not have change in an ink presentation in advance using deaeration means known conventionally preferably, such as heating and reduced pressure. The heating temperature at this time has desirable 50 degrees C or more, and, as for reduced pressure, it is more desirable that they are 50 or less mmHgs.

[0013] A plug is made with the rubber ingredient held by for example, the rubber ingredient or plastics molding, and ink output port e can suck out ink with the attraction needle formed in the printer side, if an ink cartridge is set to a printer. If a rubber stopper and the ink in a bag are divided by the plastics molding of output port, since high sealing performance will be maintained in the condition that an ink cartridge is intact, it is more desirable.

[0014] Although the seal f of the ink bag a after the ink restoration to the ink bag of drawing 2 , i.e., an up seal, is performed by the seal approaches, such as impulse heat sealing and a heat seal, and atmospheric pressure may perform a seal in ordinary temperature, it is desirable to carry out in the vacuum g of 50 or less mmHgs still more preferably below atmospheric pressure by ordinary temperature preferably. The reduced pressure seal under heating is necessarily neither a lifting nor the desirable thing which becomes empty about ebullition of ink.

[0015] Heating of the ink bag a after ink bag seal of drawing 3 is performed using Thermostat h etc., and, as for the temperature, it is desirable to carry out by ordinary pressure at 50 degrees C or more less than 70 degrees C. Consequently, the gas dissolved in ink is generated as air bubbles i in an ink bag. When the heating temperature after ink bag seal is less than 50 degrees C, even if it drives out air bubbles of an ink bag, while a dissolved gas keeps it, it is easy to become air bubbles, and becomes the cause of the ink non-regurgitation. Above 70 degrees C, deterioration and degradation of an ink bag become remarkable.

[0016] If heating of the ink bag after ink bag seal has short heating time, its cellular generation of a dissolved gas is inadequate, and since the dissolved gas which remains in ink air-bubbles-izes and causes non-regurgitation by generating of the cavitation by the oscillation of the piezo-electric element in high drive frequency, the long-term storage of packed ink, or storage in a hot location, it is preferably desirable in a 50 to 70 degrees C heating temperature requirement to carry out for 3 hours or more. However, if long duration ink is heated at an elevated temperature, in order that the effect by deterioration of ink itself or deterioration of a bag container may come out, it is desirable to stop within 200 hours on less than 70-degree C 50-degree-C or more heating conditions.

[0017] Although prior deaeration actuation is difficult when it contains the volatile high matter as an ink component, deaeration becomes an ink presentation is not changeful and possible by heating and two stage sealing of the ink bag after ink bag seal.

[0018] Promptly, standing the ink bag a, after ink restoration and seal / heating to an ink bag, the so-called two stage sealing of drawing 4 performs two stage sealing, and drives out the air bubbles in an ink bag so that air bubbles i may be put for the lower part j with Ink b from the up seal i of an ink bag. In order to abolish dispersion in the amount of purges of the air bubbles from an ink bag, and the amount of ink in an ink bag, it is good to use the fixture k for bag thickness adjustment as shown in drawing 5 at the time of two stage sealing.

[0019] After two stage sealing may be detached although the side l in which the air bubbles of a bag upper bed are confined may be attached to the body of a bag.

[0020] As a means to check the dissolved gas of an ink bag, and the amount of air bubbles, air poses a problem in almost all ink, and the method of measuring the amount of dissolved oxygen using a commercial dissolved oxygen analyzer, when an air dissolved gas is air, and presuming the whole air content is simple-like. Although the direct method of analysis in ink is also possible, with a general gas, in the case of other gases, ink can be heated by the seal system using the solubility lowering phenomenon by heating, and it can also measure the generated quantity of gas at the thing in which instrumental analysis is possible.
[0021] Moreover, if the ink jet printer using a piezo method tends [very] to be influenced of a dissolved gas or air bubbles and especially continuation injection is performed, since the non-regurgitation phenomenon of ink will be produced under the effect of a dissolved gas or air bubbles, the continuation injection trial using the system is a means effective in investigating the deaeration effectiveness, and is practical.
[0022]
[Example] Next, the example of ink, an example, and the example of a comparison are given, and this invention is explained still more concretely.
[0023]
(Example 1 of ink)
C. I. solvent black 43 The 8.0 weight sections JON krill 682 The 11.0 weight sections (styrene acrylic-acid copolymerization resin by the Johnson polymer company)
Dibutyl sebacate The 1.0 weight sections Ethanol After fully stirring and dissolving the 80.0 weight sections above-mentioned compound, the ink which filters without carrying out deaeration actuation using 0.5micro membrane filter, and uses this solution by this example was obtained.
[0024]
(Example 2 of ink)
C. The I. direct blue 199 The 1.5 weight section A diethylene glycol The 3.0 weight sections Isopropyl alcohol The 5.0 weight sections Ion exchange water It filtered without having carried out the additional dissolution of the remaining components, and carrying out deaeration actuation with the membrane filter of 0.5 micrometers of apertures, after carrying out the mixed dissolution of 90.5 weight sections above-mentioned each component, and the ink used by this example was obtained.
[0025] (Example 1) The ink obtained in the example 1 of ink was filled up with ordinary temperature ordinary pressure into the ink bag which consists of a laminate film of PET / aluminum / PE, it sealed using the impulse-heat-sealing machine, and packed ink was obtained. Next, instead of having a bag by hand, holding with the electrode holder which consists of hard plastics material, from the upper part in a bag, the seal of the lower part was carried out so that air bubbles might be put, ink was deaerated, and the packed ink containing ink 100cc was obtained.
[0026] Although the non-regurgitation of ink arose 2 to 3 times the middle in 30 pieces among 100 ink cartridges as a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, it could inject to the last, and all of remaining 70 pieces do not have the ink non-regurgitation, either, and they were able to be injected to the last.
[0027] When the upper part of the bag of the packed ink which the non-regurgitation of ink produced was sucked out by the micro syringe, air bubbles with a capacity of about 0.03 cc were caught.

[0028] (Example 2) Into the ink bag which consists of a laminate film of PET / aluminum / PE, restoration and an impulse-heat-sealing machine were used, the ink of the example 1 of ink was sealed by ordinary temperature ordinary pressure, and packed ink was obtained. Next, packed ink was heated at 50 degrees C for 5 hours, having had a bag by hand and standing it, from the upper part in a bag, the seal of the lower part was carried out so that air bubbles might be put, ink was deaerated, and the packed ink containing ink 100cc was obtained.
[0029] Although the non-regurgitation of ink arose 2 to 5 times the middle in 50 pieces among 100 ink cartridges as a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, it could inject to the last, and all of remaining 50 pieces do not have the non-regurgitation of ink, either, and they were able to be injected to the last.
[0030] When the upper part of the bag of the packed ink which the non-regurgitation of ink produced was sucked out by the micro syringe, air bubbles with a capacity of about 0.05 cc - 0.1 cc were caught.
[0031] (Example 3) In the example 2, holding with the electrode holder which consists of hard plastics material, instead of having a bag by hand, after heating packed ink at 50 degrees C for 5 hours, from the upper part in a bag, the seal of the lower part was carried out so that air bubbles might be put, ink was deaerated, and the packed ink containing ink 100cc was obtained.
[0032] Although the non-regurgitation of ink arose 2 to 5 times the middle in ten pieces among 100 ink cartridges as a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, it could inject to the last, and all of remaining 90 pieces do not have the non-regurgitation of ink, either, and they were able to be injected to the last.
[0033] When the upper part of the bag of the packed ink which the non-regurgitation of ink produced was sucked out by the micro syringe, air bubbles with a capacity of about 0.02 cc were caught.
[0034] (Example 4) The ink of the example 2 of ink was filled up with ordinary temperature ordinary pressure into the ink bag which consists of a laminate film of PET / aluminum / PE, it sealed under the reduced pressure conditions of 30mmHg(s) using the vacuum chamber type impulse-heat-sealing machine, and packed ink was obtained. Next, packed ink was heated at 60 degrees C for 15 hours, having had a bag by hand and standing it, from the upper part in a bag, the seal of the lower part was carried out so that air bubbles might be put, ink was deaerated, and the packed ink containing ink 100cc was obtained.
[0035] Although the non-regurgitation of ink arose once the middle in one piece among 100 ink cartridges as a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, it could inject to the last, and all of remaining 99 pieces do not have the non-regurgitation of ink, either, and they were able to be injected to the last.
[0036] When the upper part of the bag of the packed ink which the non-regurgitation of ink produced was sucked out by the micro syringe, air bubbles with a capacity of about 0.01 cc were caught.
[0037] (Example 5) It was filled up after heating the ink of the example 2 of ink at ordinary pressure and 70 degrees C for 1 hour into the ink bag which consists of a laminate film of PET / aluminum / PE, and it sealed using the impulse-heat-sealing machine, and packed ink was obtained. Next, 60 degrees C of packed ink were heated for 10 hours, having had a bag by hand and standing it, from the upper part in a bag, the seal of the lower part was carried out so that air

bubbles might be put, ink was deaerated, and the packed ink containing ink 100cc was obtained.
[0038] Although the non-regurgitation of ink arose 2 to 5 times the middle in five pieces among 100 ink cartridges as a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, it could inject to the last, and all of remaining 95 pieces do not have the non-regurgitation of ink, either, and they were able to be injected to the last.
[0039] When the upper part of the bag of the packed ink which the non-regurgitation of ink produced was sucked out by the micro syringe, air bubbles with a capacity of about 0.01 cc - 0.05 cc were caught.
[0040] (Example 6) In the example 5, holding with the electrode holder which consists of hard plastics material, instead of having packed ink at 60 degrees C, and having a bag by hand after 10-hour heating, from the upper part in a bag, the seal of the lower part was carried out so that air bubbles might be put, ink was deaerated, and the packed ink containing ink 100cc was obtained.
[0041] As a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, among 100 ink cartridges, the ink non-regurgitation does not have all ink cartridges on the way, either, and they were able to inject to the last.
[0042] Air bubbles were not accepted in a packed ink bag at all.
[0043] (Example 1 of a comparison) The ink of the example 1 of ink was filled up with ordinary temperature ordinary pressure into the ink bag which consists of a laminate film of PET / aluminum / PE, it sealed using the impulse-heat-sealing machine, and the packed ink containing ink 100cc was obtained.
[0044] As a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, the non-regurgitation of ink arose [all 100 ink cartridges] frequently the middle, and injection was not completed to the last.
[0045] When the upper part of the bag of the packed ink which the ink non-regurgitation produced was sucked out with the syringe, air bubbles with a capacity of about 0.5 cc - one cc were caught.
[0046] (Example 2 of a comparison) Into the ink bag which consists of a laminate film of PET / aluminum / PE, restoration and an impulse-heat-sealing machine were used, the ink of the example 2 of ink was sealed by ordinary temperature ordinary pressure, and the packed ink containing ink 100cc was obtained.
[0047] As a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, the non-regurgitation of ink arose [all 100 ink cartridges] frequently the middle, and injection was not completed to the last.
[0048] When the upper part of the bag of the packed ink which the ink non-regurgitation produced was sucked out with the syringe, air bubbles with a capacity of about 0.5 cc - one cc were caught.
[0049]
[Effect of the Invention] If a seal is carried out standing an ink bag so that air bubbles may be put for a lower part from the upper part of an ink bag after filling up with and sealing ink into the ink bag which has gas barrier nature, ink can be deaerated effectively.
[0050] Standing an ink bag, when carrying out the seal of the lower part so that air bubbles may be put, if the fixture for bag thickness adjustment is used, more effective deaeration will be attained from the upper part of an ink bag.
[0051] If a seal is carried out heating an ink bag at 50 degrees C or more, and standing an ink bag

so that air bubbles may be put for a lower part from the upper part of an ink bag after filling up with and sealing ink into the ink bag which has gas barrier nature, ink can be deaerated more effectively.
[0052] If ink restoration and/or seal are decompressed below to atmospheric pressure at a room temperature and ink deaeration is performed, still more effective deaeration will be attained.
[0053] If ink restoration and/or seal are preferably performed in ordinary temperature at 50 or less mmHgs, or they are performed, heating the temperature of ink at 50 degrees C or more by ordinary pressure, the more effective deaeration of them will be attained.
[0054] Heating of the ink bag after ink bag seal becomes possible [effective deaeration being able to carry out, if it carries out preferably at 50 degrees C or more less than 70 degrees C, and pressing down the effect on ink or an ink bag to the minimum].

TECHNICAL FIELD

[Industrial Application] This invention relates to the ink deaeration approach of the ink for ink jet record in more detail about the ink deaeration approach.

PRIOR ART

[Description of the Prior Art] An ink jet recording method tends to be influenced [the air bubbles in ink, or] of a dissolved gas, and the ink jet recording method especially using a piezo method has the problem of often producing the abnormalities in injection, with the air bubbles shut up by dissolved gases and containers, such as air dissolved in ink. Therefore, the proposal not to shut up air bubbles into clearance and the container of the dissolved gas in ink is made.
[0003] For example, the method of reducing dissolved quantity of gas is proposed by JP,52-74406,A and JP,53-61412,A by dissolving a deoxidant in water color ink by removing oxygen among the air dissolved in ink. The manufacture approach of the ink cartridge for ink jet printers which vacuum-packs further the ink by which high deaeration was carried out under a high vacuum at the time of restoration is proposed by JP,62-121062,A. When the ink manufactured using the manufacturing installation possessing a heating means and a reflux means is set by the 70-degree C environment after deaeration for 160 hours, the manufacture approach of the ink for ink jet record of having the process which controls a heating means so that the yield of nitrogen in the meantime is set to 2-10 ppm is proposed by JP,2-91165,A.

EFFECT OF THE INVENTION

[Effect of the Invention] If a seal is carried out standing an ink bag so that air bubbles may be put for a lower part from the upper part of an ink bag after filling up with and sealing ink into the ink bag which has gas barrier nature, ink can be deaerated effectively.
[0050] Standing an ink bag, when carrying out the seal of the lower part so that air bubbles may be put, if the fixture for bag thickness adjustment is used, more effective deaeration will be attained from the upper part of an ink bag.

[0051] If a seal is carried out heating an ink bag at 50 degrees C or more, and standing an ink bag so that air bubbles may be put for a lower part from the upper part of an ink bag after filling up with and sealing ink into the ink bag which has gas barrier nature, ink can be deaerated more effectively.
[0052] If ink restoration and/or seal are decompressed below to atmospheric pressure at a room temperature and ink deaeration is performed, still more effective deaeration will be attained.
[0053] If ink restoration and/or seal are preferably performed in ordinary temperature at 50 or less mmHgs, or they are performed, heating the temperature of ink at 50 degrees C or more by ordinary pressure, the more effective deaeration of them will be attained.
[0054] Heating of the ink bag after ink bag seal becomes possible [effective deaeration being able to carry out, if it carries out preferably at 50 degrees C or more less than 70 degrees C, and pressing down the effect on ink or an ink bag to the minimum].

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the approach given in above-mentioned JP,52-74406,A and JP,53-61412,A, it is only oxygen which is removable with a deoxidant, and a dissolved gas could not be removed thoroughly, but it had the trouble that the reactant after the deoxidant or the deoxidant oxidized by oxygen further had an adverse effect on the stability of ink. By the approach of a publication, it had the trouble of being easy to produce ink presentation change by evaporation of the ink component of a low-boiling point, by high deaeration in JP,62-121062,A. By the approach of a publication, it had the trouble of being easy to produce not only evaporation of a low-boiling point component but deterioration of ink, in JP,2-91165,A with heating at high temperature 80 degrees C or more and heating over 70-degree-C 160 hours of after that.
[0005] The technical problem which this invention tends to solve is to offer the ink deaeration approach of removing the air bubbles and dissolved gas in ink effectively, without there being no change and ink deterioration of an ink presentation, and spoiling the stability of ink.

MEANS

[Means for Solving the Problem] this invention person etc. came to solve this invention, as a result of repeating research wholeheartedly, in order to solve the above-mentioned technical problem.
[0007] That is, this invention offers the ink deaeration approach which carries out the seal of the lower part from the upper part of an ink bag so that air bubbles may be put, standing an ink bag, after filling up with and sealing ink into the ink bag which has gas barrier nature, in order to solve the above-mentioned technical problem.
[0008] In the above-mentioned ink deaeration approach which carries out the seal of the lower part from the upper part of an ink bag further in the approach of this invention so that air bubbles may be put while standing (1) ink bag Heating an ink bag at 50 degrees C or more, and standing an ink bag, after filling up with and sealing ink into using the fixture for bag thickness adjustment, and (2) ink bag, from the upper part of an ink bag, the seal of the lower part is

carried out so that air bubbles may be put, (3) In ordinary temperature, the ink restoration and/or seal to an ink bag are decompressed below to atmospheric pressure, and are performed, (4) At a room temperature, below atmospheric pressure, it decompresses to 50 or less mmHgs preferably, and the ink restoration and/or seal to an ink bag are performed, (5) When the temperature of ink heats preferably the ink restoration and/or seal to an ink bag at 50 degrees C or more less than 70 degrees C and performs them 50 degrees C or more by ordinary pressure, ink can be deaerated more effectively.

[0009] Hereafter, the configuration of this invention is explained to a detail along with a drawing.

[0010] The ink bag a which has the gas barrier nature of this invention of drawing 1 has the desirable laminate film which consists of laminate films more than two-layer [of the plastic material which can heat weld an inner surface like polyethylene (PE) and polypropylene (PP), and the plastic material which was excellent in the gas barrier property like polyethylene terephthalate (PET), nylon, a polyvinyl chloride, a polyvinylidene chloride, and polyvinyl alcohol in the outside surface], and has the layer of metallic foils, such as aluminum, or the metal vacuum evaporationo film between an inner surface and an outside surface preferably.

[0011] the oily ink in which the ink b with which an ink bag is filled up uses the organic solvent of water color ink, a low-boiling point, or a high-boiling point as the main solvent -- either is usable.

[0012] Although the restoration c of the ink to an ink bag does not need to perform deaeration actuation of ink in advance, deaeration d of ink may be performed to extent which does not have change in an ink presentation in advance using deaeration means known conventionally preferably, such as heating and reduced pressure. The heating temperature at this time has desirable 50 degrees C or more, and, as for reduced pressure, it is more desirable that they are 50 or less mmHgs.

[0013] A plug is made with the rubber ingredient held by for example, the rubber ingredient or plastics molding, and ink output port e can suck out ink with the attraction needle formed in the printer side, if an ink cartridge is set to a printer. If a rubber stopper and the ink in a bag are divided by the plastics molding of output port, since high sealing performance will be maintained in the condition that an ink cartridge is intact, it is more desirable.

[0014] Although the seal f of the ink bag a after the ink restoration to the ink bag of drawing 2 , i.e., an up seal, is performed by the seal approaches, such as impulse heat sealing and a heat seal, and atmospheric pressure may perform a seal in ordinary temperature, it is desirable to carry out in the vacuum g of 50 or less mmHgs still more preferably below atmospheric pressure by ordinary temperature preferably. The reduced pressure seal under heating is necessarily neither a lifting nor the desirable thing which becomes empty about ebullition of ink.

[0015] Heating of the ink bag a after ink bag seal of drawing 3 is performed using Thermostat h etc., and, as for the temperature, it is desirable to carry out by ordinary pressure at 50 degrees C or more less than 70 degrees C. Consequently, the gas dissolved in ink is generated as air bubbles i in an ink bag. When the heating temperature after ink bag seal is less than 50 degrees C, even if it drives out air bubbles of an ink bag, while a dissolved gas keeps it, it is easy to become air bubbles, and becomes the cause of the ink non-regurgitation. Above 70 degrees C, deterioration and degradation of an ink bag become remarkable.

[0016] If heating of the ink bag after ink bag seal has short heating time, its cellular generation of a dissolved gas is inadequate, and since the dissolved gas which remains in ink air-bubbles-izes and causes non-regurgitation by generating of the cavitation by the oscillation of the piezo-

electric element in high drive frequency, the long-term storage of packed ink, or storage in a hot location, it is preferably desirable in a 50 to 70 degrees C heating temperature requirement to carry out for 3 hours or more. However, if long duration ink is heated at an elevated temperature, in order that the effect by deterioration of ink itself or deterioration of a bag container may come out, it is desirable to stop within 200 hours on less than 70-degree C 50-degree-C or more heating conditions.

[0017] Although prior deaeration actuation is difficult when it contains the volatile high matter as an ink component, deaeration becomes an ink presentation is not changeful and possible by heating and two stage sealing of the ink bag after ink bag seal.

[0018] Promptly, standing the ink bag a, after ink restoration and seal / heating to an ink bag, the so-called two stage sealing of drawing 4 performs two stage sealing, and drives out the air bubbles in an ink bag so that air bubbles i may be put for the lower part j with Ink b from the up seal i of an ink bag. In order to abolish dispersion in the amount of purges of the air bubbles from an ink bag, and the amount of ink in an ink bag, it is good to use the fixture k for bag thickness adjustment as shown in drawing 5 at the time of two stage sealing.

[0019] After two stage sealing may be detached although the side l in which the air bubbles of a bag upper bed are confined may be attached to the body of a bag.

[0020] As a means to check the dissolved gas of an ink bag, and the amount of air bubbles, air poses a problem in almost all ink, and the method of measuring the amount of dissolved oxygen using a commercial dissolved oxygen analyzer, when an air dissolved gas is air, and presuming the whole air content is simple-like. Although the direct method of analysis in ink is also possible, with a general gas, in the case of other gases, ink can be heated by the seal system using the solubility lowering phenomenon by heating, and it can also measure the generated quantity of gas at the thing in which instrumental analysis is possible.

[0021] Moreover, if the ink jet printer using a piezo method tends [very] to be influenced of a dissolved gas or air bubbles and especially continuation injection is performed, since the non-regurgitation phenomenon of ink will be produced under the effect of a dissolved gas or air bubbles, the continuation injection trial using the system is a means effective in investigating the deaeration effectiveness, and is practical.

EXAMPLE

[Example] Next, the example of ink, an example, and the example of a comparison are given, and this invention is explained still more concretely.

[0023]

(Example 1 of ink)

C. I. solvent black 43 The 8.0 weight sections JON krill 682 The 11.0 weight sections (styrene acrylic-acid copolymerization resin by the Johnson polymer company)

Dibutyl sebacate The 1.0 weight sections Ethanol After fully stirring and dissolving the 80.0 weight sections above-mentioned compound, the ink which filters without carrying out deaeration actuation using 0.5micro membrane filter, and uses this solution by this example was obtained.

[0024]

(Example 2 of ink)

C. I. direct blue 199 The 1.5 weight sections Diethylene glycol The 3.0 weight sections Isopropyl

alcohol The 5.0 weight sections Ion exchange water 90.5 weight sections above-mentioned each component It filtered without having carried out the additional dissolution of the remaining components, and carrying out deaeration actuation with the membrane filter of 0.5 micrometers of apertures, after carrying out the mixed dissolution, and the ink used by this example was obtained.

[0025] (Example 1) The ink obtained in the example 1 of ink was filled up with ordinary temperature ordinary pressure into the ink bag which consists of a laminate film of PET / aluminum / PE, it sealed using the impulse-heat-sealing machine, and packed ink was obtained. Next, instead of having a bag by hand, holding with the electrode holder which consists of hard plastics material, from the upper part in a bag, the seal of the lower part was carried out so that air bubbles might be put, ink was deaerated, and the packed ink containing ink 100cc was obtained.

[0026] Although the non-regurgitation of ink arose 2 to 3 times the middle in 30 pieces among 100 ink cartridges as a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, it could inject to the last, and all of remaining 70 pieces do not have the ink non-regurgitation, either, and they were able to be injected to the last.

[0027] When the upper part of the bag of the packed ink which the non-regurgitation of ink produced was sucked out by the micro syringe, air bubbles with a capacity of about 0.03 cc were caught.

[0028] (Example 2) Into the ink bag which consists of a laminate film of PET / aluminum / PE, restoration and an impulse-heat-sealing machine were used, the ink of the example 1 of ink was sealed by ordinary temperature ordinary pressure, and packed ink was obtained. Next, packed ink was heated at 50 degrees C for 5 hours, having had a bag by hand and standing it, from the upper part in a bag, the seal of the lower part was carried out so that air bubbles might be put, ink was deaerated, and the packed ink containing ink 100cc was obtained.

[0029] Although the non-regurgitation of ink arose 2 to 5 times the middle in 50 pieces among 100 ink cartridges as a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, it could inject to the last, and all of remaining 50 pieces do not have the non-regurgitation of ink, either, and they were able to be injected to the last.

[0030] When the upper part of the bag of the packed ink which the non-regurgitation of ink produced was sucked out by the micro syringe, air bubbles with a capacity of about 0.05 cc - 0.1 cc were caught.

[0031] (Example 3) In the example 2, holding with the electrode holder which consists of hard plastics material, instead of having a bag by hand, after heating packed ink at 50 degrees C for 5 hours, from the upper part in a bag, the seal of the lower part was carried out so that air bubbles might be put, ink was deaerated, and the packed ink containing ink 100cc was obtained.

[0032] Although the non-regurgitation of ink arose 2 to 5 times the middle in ten pieces among 100 ink cartridges as a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, it could inject to the last, and all of remaining 90 pieces do not have the non-regurgitation of ink, either, and they were able to be injected to the last.

[0033] When the upper part of the bag of the packed ink which the non-regurgitation of ink produced was sucked out by the micro syringe, air bubbles with a capacity of about 0.02 cc were caught.

[0034] (Example 4) The ink of the example 2 of ink was filled up with ordinary temperature ordinary pressure into the ink bag which consists of a laminate film of PET / aluminum / PE, it sealed under the reduced pressure conditions of 30mmHg(s) using the vacuum chamber type impulse-heat-sealing machine, and packed ink was obtained. Next, packed ink was heated at 60 degrees C for 15 hours, having had a bag by hand and standing it, from the upper part in a bag, the seal of the lower part was carried out so that air bubbles might be put, ink was deaerated, and the packed ink containing ink 100cc was obtained.
[0035] Although the non-regurgitation of ink arose once the middle in one piece among 100 ink cartridges as a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, it could inject to the last, and all of remaining 99 pieces do not have the non-regurgitation of ink, either, and they were able to be injected to the last.
[0036] When the upper part of the bag of the packed ink which the non-regurgitation of ink produced was sucked out by the micro syringe, air bubbles with a capacity of about 0.01 cc were caught.
[0037] (Example 5) It was filled up after heating the ink of the example 2 of ink at ordinary pressure and 70 degrees C for 1 hour into the ink bag which consists of a laminate film of PET / aluminum / PE, and it sealed using the impulse-heat-sealing machine, and packed ink was obtained. Next, 60 degrees C of packed ink were heated for 10 hours, having had a bag by hand and standing it, from the upper part in a bag, the seal of the lower part was carried out so that air bubbles might be put, ink was deaerated, and the packed ink containing ink 100cc was obtained.
[0038] Although the non-regurgitation of ink arose 2 to 5 times the middle in five pieces among 100 ink cartridges as a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, it could inject to the last, and all of remaining 95 pieces do not have the non-regurgitation of ink, either, and they were able to be injected to the last.
[0039] When the upper part of the bag of the packed ink which the non-regurgitation of ink produced was sucked out by the micro syringe, air bubbles with a capacity of about 0.01 cc - 0.05 cc were caught.
[0040] (Example 6) In the example 5, holding with the electrode holder which consists of hard plastics material, instead of having packed ink at 60 degrees C, and having a bag by hand after 10-hour heating, from the upper part in a bag, the seal of the lower part was carried out so that air bubbles might be put, ink was deaerated, and the packed ink containing ink 100cc was obtained.
[0041] As a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, among 100 ink cartridges, the ink non-regurgitation does not have all ink cartridges on the way, either, and they were able to inject to the last.
[0042] Air bubbles were not accepted in a packed ink bag at all.
[0043] (Example 1 of a comparison) The ink of the example 1 of ink was filled up with ordinary temperature ordinary pressure into the ink bag which consists of a laminate film of PET / aluminum / PE, it sealed using the impulse-heat-sealing machine, and the packed ink containing ink 100cc was obtained.
[0044] As a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, the non-regurgitation of ink arose [all 100 ink cartridges] frequently the middle, and injection was not completed to the last.
[0045] When the upper part of the bag of the packed ink which the ink non-regurgitation

produced was sucked out with the syringe, air bubbles with a capacity of about 0.5 cc - one cc were caught.
[0046] (Example 2 of a comparison) Into the ink bag which consists of a laminate film of PET / aluminum / PE, restoration and an impulse-heat-sealing machine were used, the ink of the example 2 of ink was sealed by ordinary temperature ordinary pressure, and the packed ink containing ink 100cc was obtained.
[0047] As a result of equipping a piezo type ink jet printer with the ink cartridge which contained packed ink in the hard case and performing continuation injection, the non-regurgitation of ink arose [all 100 ink cartridges] frequently the middle, and injection was not completed to the last.
[0048] When the upper part of the bag of the packed ink which the ink non-regurgitation produced was sucked out with the syringe, air bubbles with a capacity of about 0.5 cc - one cc were caught.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the mimetic diagram having shown the process filled up with ink into the ink bag and ink bag which are used by this invention.
[Drawing 2] It is the mimetic diagram having shown the seal process of an ink bag.
[Drawing 3] It is the mimetic diagram having shown the air bubbles generated in a bag with the heating process of an ink bag, and heating.
[Drawing 4] It is the front view of the ink bag after two stage sealing.
[Drawing 5] They are the side elevation of the fixture k for bag thickness adjustment, and the side elevation of the ink bag after two stage sealing using it.
[Description of Notations]
Ink bag
b Ink
c Restoration opening
d Deaeration
e Ink output port
f Up seal section
g Vacuum system
h Thermostat
i Air bubbles
j Two-stage-sealing section
k The fixture for bag thickness adjustment
l Cellular closing ******

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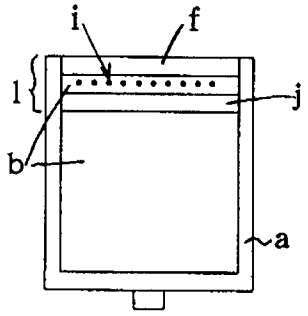
(54)【発明の名称】　インク脱気方法

(57)【要約】

【構成】　ガスバリアー性を有するインク袋にインクを充填、密封した後、インク袋を立てながらインク袋の上部から下の部分を気泡を挟み込むようにシールするインク脱気方法。

【効果】　本発明のインク脱気方法によれば、インク組成変化や袋材料の変質を生じることなく、インク袋中の脱気が可能となり、インクジェット記録において安定したインクの噴射が可能となる。



【特許請求の範囲】
【請求項１】　ガスバリアー性を有するインク袋にインクを充填、密封した後、インク袋を立てながらインク袋の上部から下の部分を気泡を挟み込むようにシールすることを特徴とするインク脱気方法。
【請求項２】　インク袋を立てながらインク袋の上部から下の部分を気泡を挟み込むようにシールする時に、袋厚調整用治具を用いることを特徴とする請求項１記載のインク脱気方法。
【請求項３】　ガスバリアー性を有するインク袋にインクを充填、密封した後、インク袋を５０℃以上に加熱し、インク袋を立てながらインク袋の上部から下の部分を気泡を挟み込むようにシールすることを特徴とする請求項１又は２記載のインク脱気方法。
【請求項４】　インク袋へのインク充填及び／又は密封を、常温で大気圧以下に減圧して行なうことを特徴とする請求項１、２又は３記載の記載のインク脱気方法。
【請求項５】　インク袋へのインク充填及び／又は密封を５０ｍｍＨｇ以下で行なうことを特徴とする請求項４記載のインク脱気方法。
【請求項６】　インク袋へのインク充填及び／又は密封を、常圧でインクの温度が５０℃以上に加熱しながら行なうことを特徴とする請求項１、２又は３記載のインク脱気方法。
【請求項７】　インク袋密封後のインク袋の加熱温度が、５０℃以上７０℃未満であることを特徴とする請求項３記載のインク脱気方法。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】本発明はインク脱気方法に関し、更に詳しくはインクジェット記録用インクのインク脱気方法に関する。
【０００２】
【従来の技術】インクジェット記録方式は、インク中の気泡や溶存気体の影響を受けやすく、特にピエゾ方式を用いたインクジェット記録方式は、インクに溶存している空気等の溶存気体や容器に閉じ込められている気泡によって、しばしば噴射異常を生じるという問題を有している。そのため、インク中の溶存気体の除去や容器中に気泡が閉じ込められないための提案がなされている。
【０００３】例えば、特開昭５２－７４４０６号公報及び特開昭５３－６１４１２号公報には、水性インクに脱酸素剤を溶解させることにより、インク中に溶存している空気のうち酸素を除去することにより溶存気体量を低減させる方法が提案されている。特開昭６２－１２１０６２号公報には、高脱気されたインクを、充填時に更に高真空下で真空包装するインクジェットプリンタ用インクカートリッジの製造方法が提案されている。特開平２－９１１６５号公報には、加熱手段及び還流手段を具備する製造装置を用いて製造したインクを、脱気後７０℃の環境に１６０時間おいた時に、その間の窒素の発生量が、２～１０ｐｐｍになるように加熱手段を制御する工程を有するインクジェット記録用インクの製造方法が提案されている。
【０００４】
【発明が解決しようとする課題】上記特開昭５２－７４４０６号公報及び特開昭５３－６１４１２号公報に記載の方法では、脱酸素剤で除去できるのが酸素のみであり、完全に溶存気体を除去できず、更に脱酸素剤又は脱酸素剤が酸素によって酸化された後の反応物がインクの安定性に悪影響を及ぼすという問題点を有していた。特開昭６２－１２１０６２号公報に記載の方法では、高脱気により低沸点のインク成分の蒸発によりインク組成変化を生じやすいという問題点を有していた。特開平２－９１１６５号公報に記載の方法では、８０℃以上の高温加熱とその後の７０℃１６０時間にわたる加熱により、低沸点成分の蒸発のみならず、インクの変質を生じ易いという問題点を有していた。
【０００５】本発明が解決しようとする課題は、インク組成の変化やインク変質がなく、インクの安定性を損なうことなく、インク中の気泡や溶存気体を効果的に除去するインク脱気方法を提供することにある。
【０００６】
【課題を解決するための手段】本発明者等は、上記課題を解決するために鋭意研究を重ねた結果、本発明を解決するに至った。
【０００７】即ち、本発明は上記課題を解決するために、ガスバリアー性を有するインク袋にインクを充填、密封した後、インク袋を立てながらインク袋の上部から下の部分を気泡を挟み込むようにシールするインク脱気方法を提供する。
【０００８】本発明の方法においては、更に、（１）インク袋を立てながらインク袋の上部から下の部分を気泡を挟み込むようにシールする上記インク脱気方法において、袋厚調整用治具を用いること、（２）インク袋にインクを充填、密封した後、インク袋を５０℃以上に加熱し、インク袋を立てながらインク袋の上部から下の部分を気泡を挟み込むようにシールすること、（３）インク袋へのインク充填及び／又は密封を、常温で大気圧以下に減圧して行なうこと、（４）室温で大気圧以下、好ましくは５０ｍｍＨｇ以下に減圧してインク袋へのインク充填及び／又は密封を行なうこと、（５）インク袋へのインク充填及び／又は密封を、常圧でインクの温度が５０℃以上、好ましくは５０℃以上７０℃未満に加熱して行なうことにより、より効果的にインクの脱気を行なうことができる。
【０００９】以下、本発明の構成を図面に沿って詳細に説明を行なう。
【００１０】図１の本発明のガスバリアー性を有するインク袋ａは、例えば、内面をポリエチレン（ＰＥ）やポ

リプロピレン（ＰＰ）の如き熱溶着可能なプラスチック材料、外面をポリエチレンテレフタレート（ＰＥＴ）、ナイロン、ポリ塩化ビニル、ポリ塩化ビニリデン、ポリビニルアルコールの如きガスバリア性に優れたプラスチック材料の２層以上のラミネートフィルムで構成され、好ましくは内面と外面の間にアルミニウムなどの金属箔あるいは金属蒸着膜の層を有するラミネートフィルムが望ましい。

【００１１】インク袋に充填されるインクｂは、水性インクや、低沸点や高沸点の有機溶剤を主溶剤とする油性インクどちらでも使用可能である。

【００１２】インク袋へのインクの充填ｃは、インクの脱気操作を事前に行なわなくてもよいが、好ましくは従来知られている加熱や減圧等の脱気手段を用いて、インク組成に変化がない程度に事前にインクの脱気ｄを行なってもよい。この時の加熱温度は５０℃以上が好ましく、また減圧は５０ｍｍＨｇ以下であることがより好ましい。

【００１３】インク取り出し口ｅは、例えば、ゴム材料又はプラスチック成型物で保持されたゴム材料で栓がなされ、インクカートリッジがプリンターにセットされるとプリンター側に設けられた吸引針でインクを吸い出すことができる。ゴム栓と袋内のインクとが取り出し口のプラスチック成型物によって仕切られていると、インクカートリッジが未使用の状態では高い密封性が保たれるので、より好ましい。

【００１４】図２のインク袋へのインク充填後のインク袋ａの密封、すなわち上部シールｆは、インパルスシールや熱シール等のシール方法で行なうが、シールは常温で大気圧で行なってもよいが、好ましくは常温で大気圧以下、更に好ましくは５０ｍｍＨｇ以下の真空ｇで行なうことが望ましい。加熱下の減圧シールは、インクの沸騰を起こしやすく、必ずしも好ましいものではない。

【００１５】図３のインク袋密封後のインク袋ａの加熱は、恒温装置ｈ等を用いて行ない、その温度は、常圧で５０℃以上７０℃未満で行なうことが好ましい。その結果、インクに溶存する気体はインク袋内に気泡ｉとして発生する。インク袋密封後の加熱温度が５０℃未満の場合は、インク袋から気泡を追い出しても溶存気体が保管中に気泡になり易く、インク不吐出の原因となる。７０℃以上ではインク袋の変質・劣化が顕著になる。

【００１６】インク袋密封後のインク袋の加熱は、加熱時間が短いと溶存気体の気泡生成が不十分であり、高い駆動周波数でのピエゾ素子の振動によるキャビテーションの発生や、袋詰めインクの長期保管や暑い場所での保管によって、インク中に残存している溶存気体が気泡化して不吐出の原因となるため、好ましくは５０℃から７０℃の加熱温度範囲では３時間以上行なうことが望ましい。しかしながら、高温で長時間インクを加熱すると、インク自体の変質や袋容器の変質による影響が出るため、５０℃以上７０℃未満の加熱条件では２００時間以内に留めることが好ましい。

【００１７】インク成分として揮発性の高い物質を含有する場合には、事前の脱気操作が困難であるが、インク袋密封後のインク袋の加熱・二次シールによってインク組成の変化なく脱気が可能となる。

【００１８】図４のいわゆる二次シールは、インク袋へのインク充填・密封・加熱後、速やかに、インク袋ａを立てながらインク袋の上部シールｉから下の部分ｊをインクｂと共に気泡ｉを挟み込むように二次シールを行なってインク袋内の気泡を追い出す。インク袋からの気泡の追い出し量及びインク袋内のインク量のばらつきを無くすため、二次シール時に、図５に示したような袋厚調整用治具ｋを用いるとよい。

【００１９】二次シール後は、袋上端の気泡が閉じ込められている側ｌを袋本体に付けたままでもよいが、切り離してもよい。

【００２０】インク袋の溶存気体及び気泡の量を確認する手段としては、ほとんどのインクにおいて問題となるのが空気であり、空気溶存気体が空気の場合は市販の溶存酸素計を用いて溶存酸素量を測定し、全体の空気量を推定する方法が最も簡易的である。その他の気体の場合は、機器分析可能なものでは、インクでの直接分析も可能であるが、一般の気体では加熱による溶解度低下現象を利用してインクを密封系で加熱し、発生した気体量を測定することもできる。

【００２１】また、ピエゾ方式を用いたインクジェットプリンターは、溶存気体や気泡の影響を非常に受けやすく、特に連続噴射を行なうと溶存気体や気泡の影響によりインクの不吐出現象を生じることから、実機を用いた連続噴射試験は脱気効果を調べるには有効な手段であり、実際的である。

【００２２】

【実施例】次にインク例、実施例及び比較例を挙げて本発明を更に具体的に説明する。

【００２３】

（インク例１）

Ｃ．Ｉ．ソルベントブラック４３	８．０重量部
ジョンクリル６８２	１１．０重量部
（ジョンソンポリマー社製スチレンアクリル酸共重合樹脂）	
セバシン酸ジブチル	１．０重量部
エタノール	８０．０重量部

上記配合物を十分に攪拌、溶解した後、この溶液を０．５μメンブランフィルターを用いて脱気操作をすること

なしに濾過を行ない、本実施例で使用するインクを得た。

（インク例２）

Ｃ．Ｉ．ダイレクトブルー１９９	１．５重量部
ジエチレングリコール	３．０重量部
イソプロピルアルコール	５．０重量部
イオン交換水	９０．５重量部

上記各成分を混合溶解した後に残りの成分を追加溶解し、孔径０．５μｍのメンブランフィルターで脱気操作をすることなしに濾過を行ない、本実施例で使用するインクを得た。

【００２５】（実施例１）ＰＥＴ／アルミニウム／ＰＥのラミネートフィルムからなるインク袋にインク例１で得たインクを常温常圧で充填し、インパルスシール機を用いて密封して袋詰めインクを得た。次に、袋を手で持つ代わりに、堅いプラスチック材からなるホルダーで保持しながら袋の上部から下の部分を気泡を挟み込むようにシールしてインクを脱気してインク１００ｃｃ入りの袋詰めインクを得た。

【００２６】袋詰めインクをハードケースに収納したインクカートリッジをピエゾ式インクジェットプリンターに装着して連続噴射を行なった結果、インクカートリッジ１００個中３０個で途中２～３回インクの不吐出が生じたが、最後まで噴射が可能であり、残り７０個は、全てインク不吐出もなく、最後まで噴射が可能であった。

【００２７】インクの不吐出が生じた袋詰めインクの袋の上部をマイクロシリンジで吸い出したところ、容量約０．０３ｃｃの気泡が捕捉された。

【００２８】（実施例２）ＰＥＴ／アルミニウム／ＰＥのラミネートフィルムからなるインク袋にインク例１のインクを常温常圧で充填、インパルスシール機を用いて密封して袋詰めインクを得た。次に、袋詰めインクを５０℃で５時間加熱し、袋を手で持ち、立てながら袋の上部から下の部分を気泡を挟み込むようにシールしてインクを脱気してインク１００ｃｃ入りの袋詰めインクを得た。

【００２９】袋詰めインクをハードケースに収納したインクカートリッジをピエゾ式インクジェットプリンターに装着して連続噴射を行なった結果、インクカートリッジ１００個中５０個で途中２～５回インクの不吐出が生じたが、最後まで噴射が可能であり、残り５０個は、全てインクの不吐出もなく、最後まで噴射が可能であった。

【００３０】インクの不吐出が生じた袋詰めインクの袋の上部をマイクロシリンジで吸い出したところ、容量約０．０５ｃｃ～０．１ｃｃの気泡が捕捉された。

【００３１】（実施例３）実施例２において、袋詰めインクを５０℃で５時間加熱した後、袋を手で持つ代わりに、堅いプラスチック材からなるホルダーで保持しながら袋の上部から下の部分を気泡を挟み込むようにシールしてインクを脱気してインク１００ｃｃ入りの袋詰めインクを得た。

【００３２】袋詰めインクをハードケースに収納したインクカートリッジをピエゾ式インクジェットプリンターに装着して連続噴射を行なった結果、インクカートリッジ１００個中１０個で途中２～５回インクの不吐出が生じたが、最後まで噴射が可能であり、残り９０個は、全てインクの不吐出もなく、最後まで噴射が可能であった。

【００３３】インクの不吐出が生じた袋詰めインクの袋の上部をマイクロシリンジで吸い出したところ、容量約０．０２ｃｃの気泡が捕捉された。

【００３４】（実施例４）ＰＥＴ／アルミニウム／ＰＥのラミネートフィルムからなるインク袋にインク例２のインクを常温常圧で充填し、真空チャンバー式インパルスシール機を用いて３０ｍｍＨｇの減圧条件下で密封して袋詰めインクを得た。次に、袋詰めインクを６０℃で１５時間加熱し、袋を手で持ち、立てながら袋の上部から下の部分を気泡を挟み込むようにシールしてインクを脱気してインク１００ｃｃ入りの袋詰めインクを得た。

【００３５】袋詰めインクをハードケースに収納したインクカートリッジをピエゾ式インクジェットプリンターに装着して連続噴射を行なった結果、インクカートリッジ１００個中１個で途中１回インクの不吐出が生じたが、最後まで噴射が可能であり、残り９９個は、全てインクの不吐出もなく、最後まで噴射が可能であった。

【００３６】インクの不吐出が生じた袋詰めインクの袋の上部をマイクロシリンジで吸い出したところ、容量約０．０１ｃｃの気泡が捕捉された。

【００３７】（実施例５）ＰＥＴ／アルミニウム／ＰＥのラミネートフィルムからなるインク袋にインク例２のインクを常圧、７０℃で１時間加熱した後に充填し、インパルスシール機を用いて密封して袋詰めインクを得た。次に、袋詰めインクを６０℃１０時間加熱し、袋を手で持ち、立てながら袋の上部から下の部分を気泡を挟み込むようにシールしてインクを脱気してインク１００ｃｃ入りの袋詰めインクを得た。

【００３８】袋詰めインクをハードケースに収納したインクカートリッジをピエゾ式インクジェットプリンターに装着して連続噴射を行なった結果、インクカートリッジ１００個中５個で途中２～５回インクの不吐出が生じたが、最後まで噴射が可能であり、残り９５個は全てインクの不吐出もなく、最後まで噴射が可能であった。

【００３９】インクの不吐出が生じた袋詰めインクの袋の上部をマイクロシリンジで吸い出したところ、容量約０．０１ｃｃ～０．０５ｃｃの気泡が捕捉された。

【００４０】（実施例６）実施例５において、袋詰めインクを６０℃で１０時間加熱後、袋を手で持つ代わりに、堅いプラスチック材からなるホルダーで保持しながら袋の上部から下の部分を気泡を挟み込むようにシールしてインクを脱気してインク１００ｃｃ入りの袋詰めインクを得た。

【００４１】袋詰めインクをハードケースに収納したインクカートリッジをピエゾ式インクジェットプリンターに装着して連続噴射を行なった結果、インクカートリッジ１００個中全てのインクカートリッジが、途中でインク不吐出もなく最後まで噴射が可能であった。

【００４２】袋詰めインク袋には気泡は全く認められなかった。

【００４３】（比較例１）ＰＥＴ／アルミニウム／ＰＥのラミネートフィルムからなるインク袋にインク例１のインクを常温常圧で充填し、インパルスシール機を用いて密封してインク１００ｃｃ入りの袋詰めインクを得た。

【００４４】袋詰めインクをハードケースに収納したインクカートリッジをピエゾ式インクジェットプリンターに装着して連続噴射を行なった結果、１００個全てのインクカートリッジが途中頻繁にインクの不吐出が生じ、最後まで噴射ができなかった。

【００４５】インク不吐出が生じた袋詰めインクの袋の上部を注射器で吸い出したところ、容量約０．５ｃｃ～１ｃｃの気泡が捕捉された。

【００４６】（比較例２）ＰＥＴ／アルミニウム／ＰＥのラミネートフィルムからなるインク袋にインク例２のインクを常温常圧で充填、インパルスシール機を用いて密封してインク１００ｃｃ入りの袋詰めインクを得た。

【００４７】袋詰めインクをハードケースに収納したインクカートリッジをピエゾ式インクジェットプリンターに装着して連続噴射を行なった結果、１００個全てのインクカートリッジが途中頻繁にインクの不吐出が生じ、最後まで噴射ができなかった。

【００４８】インク不吐出が生じた袋詰めインクの袋の上部を注射器で吸い出したところ、容量約０．５ｃｃ～１ｃｃの気泡が捕捉された。

【００４９】

【発明の効果】ガスバリアー性を有するインク袋にインクを充填、密封した後、インク袋を立てながらインク袋の上部から下の部分を気泡を挟み込むようにシールをすると、効果的にインクを脱気することができる。

【００５０】インク袋を立てながらインク袋の上部から下の部分を気泡を挟み込むようにシールする時に、袋厚調整用治具を用いるとより効果的な脱気が可能となる。

【００５１】ガスバリアー性を有するインク袋にインクを充填、密封した後、インク袋を５０℃以上に加熱し、インク袋を立てながらインク袋の上部から下の部分を気泡を挟み込むようにシールをすると、より効果的にインクを脱気することができる。

【００５２】インク充填及び／又は密封を室温で大気圧以下に減圧してインク脱気を行なうと、更に効果的な脱気が可能となる。

【００５３】インク充填及び／又は密封は、常温で好ましくは５０ｍｍＨｇ以下で行なうか、あるいは、常圧でインクの温度を５０℃以上に加熱しながら行なうと、より効果的な脱気が可能となる。

【００５４】インク袋密封後のインク袋の加熱は、好ましくは５０℃以上７０℃未満で行なうと効果的な脱気が行なうことができ、かつインクやインク袋への影響を最小限に押さえることが可能となる。

【図面の簡単な説明】

【図１】本発明で使用するインク袋及びインク袋にインクを充填する工程を示した模式図である。

【図２】インク袋の密封工程を示した模式図である。

【図３】インク袋の加熱工程と加熱により袋内に発生する気泡を示した模式図である。

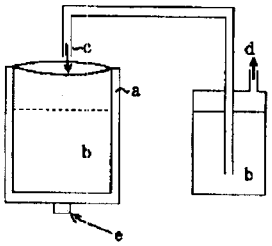
【図４】二次シール後のインク袋の正面図である。

【図５】袋厚調整用治具ｋの側面図とそれを用いた二次シール後のインク袋の側面図である。

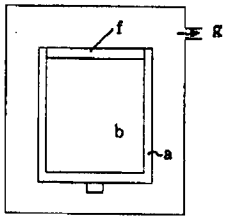
【符号の説明】

a　インク袋
b　インク
c　充填口
d　脱気
e　インク取り出し口
f　上部シール部
g　真空系
h　恒温装置
i　気泡
j　二次シール部
k　袋厚調整用治具
l　気泡閉じ込め部

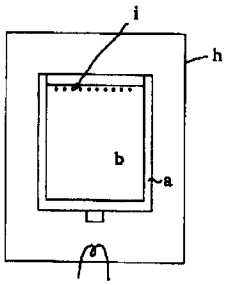
【図１】



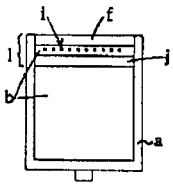
【図２】



【図３】



【図４】



【図５】